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Holtermann et al.

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[54] **OIL METERING DEVICE FOR SUPPLYING OIL TO A FUEL TANK**

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[73] Assignee: **Outboard Marine Corporation**, Waukegan, Ill.

[21] Appl. No.: **687,870**

[22] Filed: **Dec. 31, 1984**

[51] **Int. Cl.**[4] **F02B 33/04**

[52] **U.S. Cl.** ..... **123/73 AD**; 123/196 R

[58] **Field of Search** ..... 123/73 AD, 196 R, 73 AB; 137/99; 417/418

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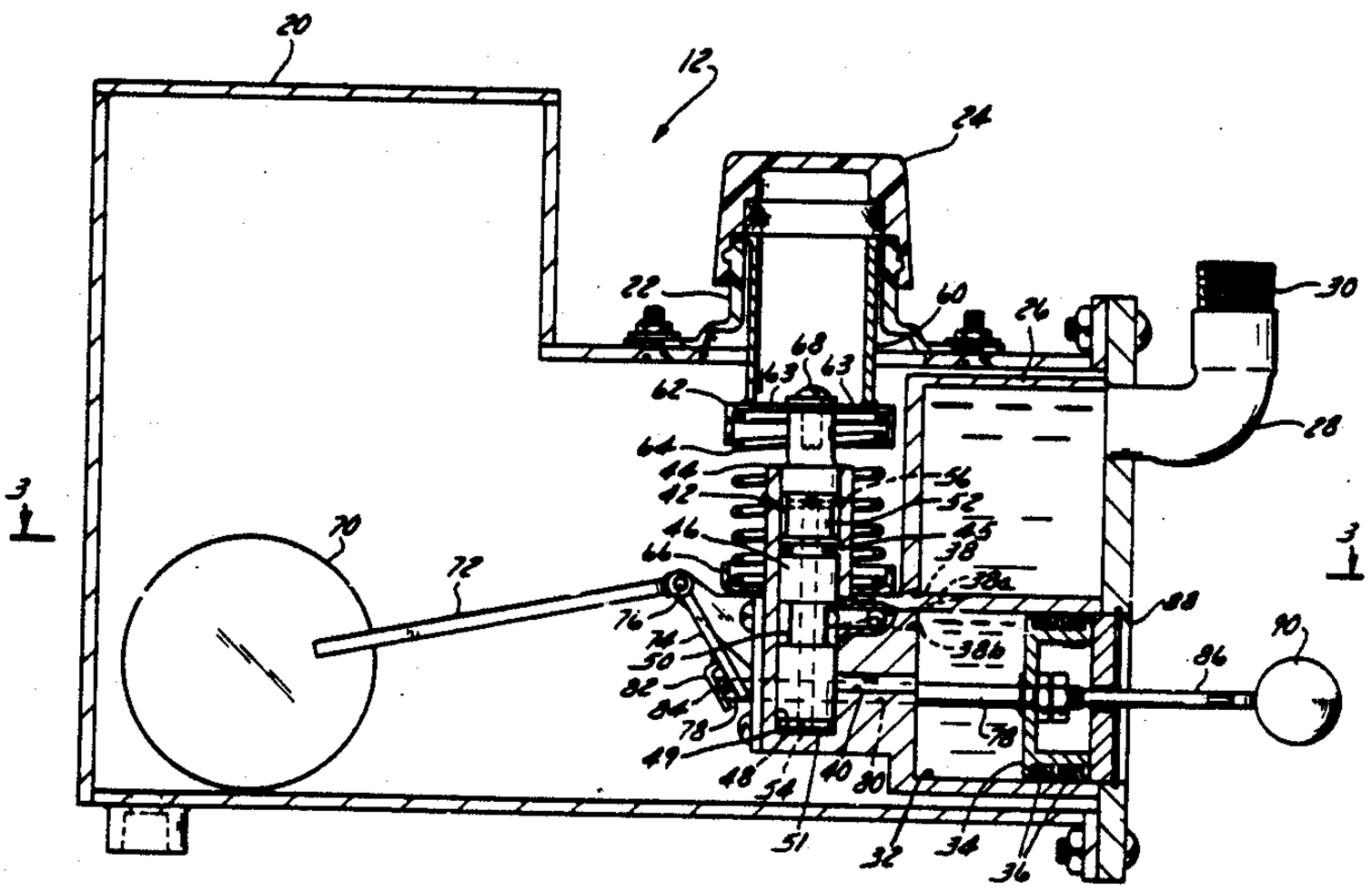
Primary Examiner—Carl Steuart Miller
Attorney, Agent, or Firm—Michael, Best & Friedrich

[57] **ABSTRACT**

A fuel tank includes a first container adapted to contain a fuel mixture, and a second container adapted to contain oil. A metering arrangement is provided for selectively delivering a measured quantity of said oil from the second container to the first container when fuel is added to the first container. The volume of the oil delivered to the first container being proportional to the volume of fuel added to the first container. A valve assembly is also provided for alternatively providing fluid communication between a metering chamber and the first container and the metering chamber and the second container and for permitting oil flow to the first container only when the fuel tank cap is removed.

22 Claims, 10 Drawing Figures



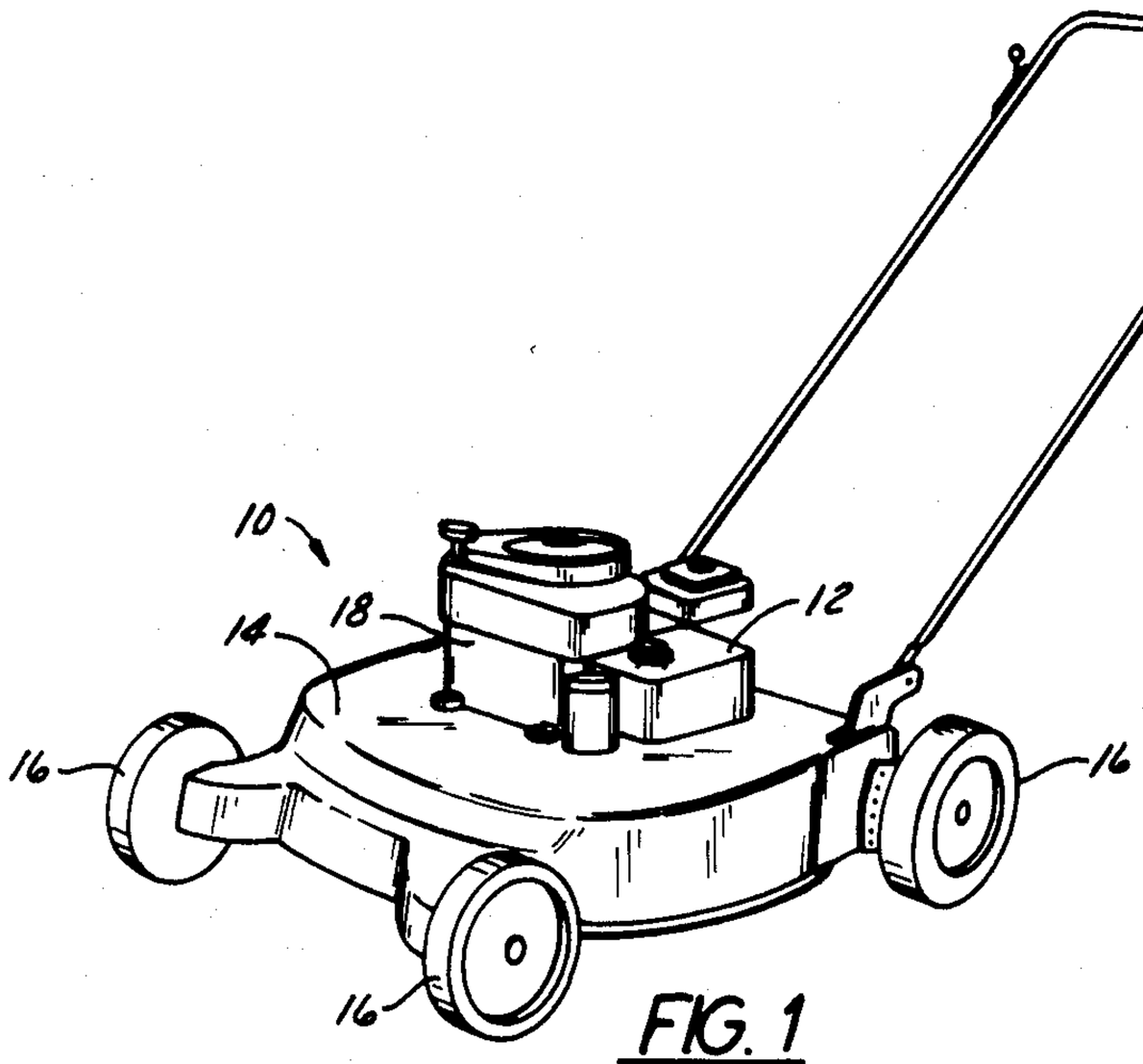

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FIG. 1

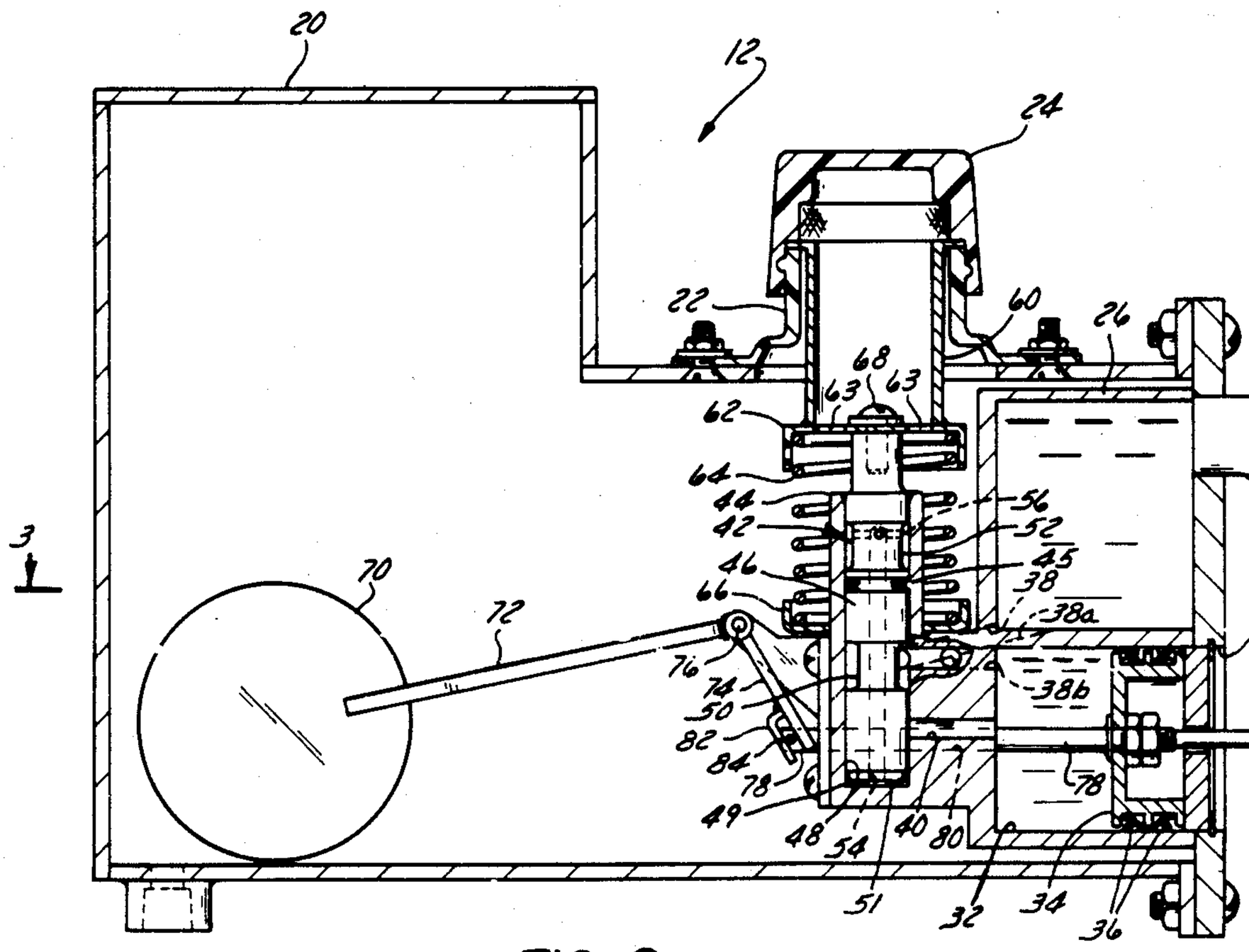
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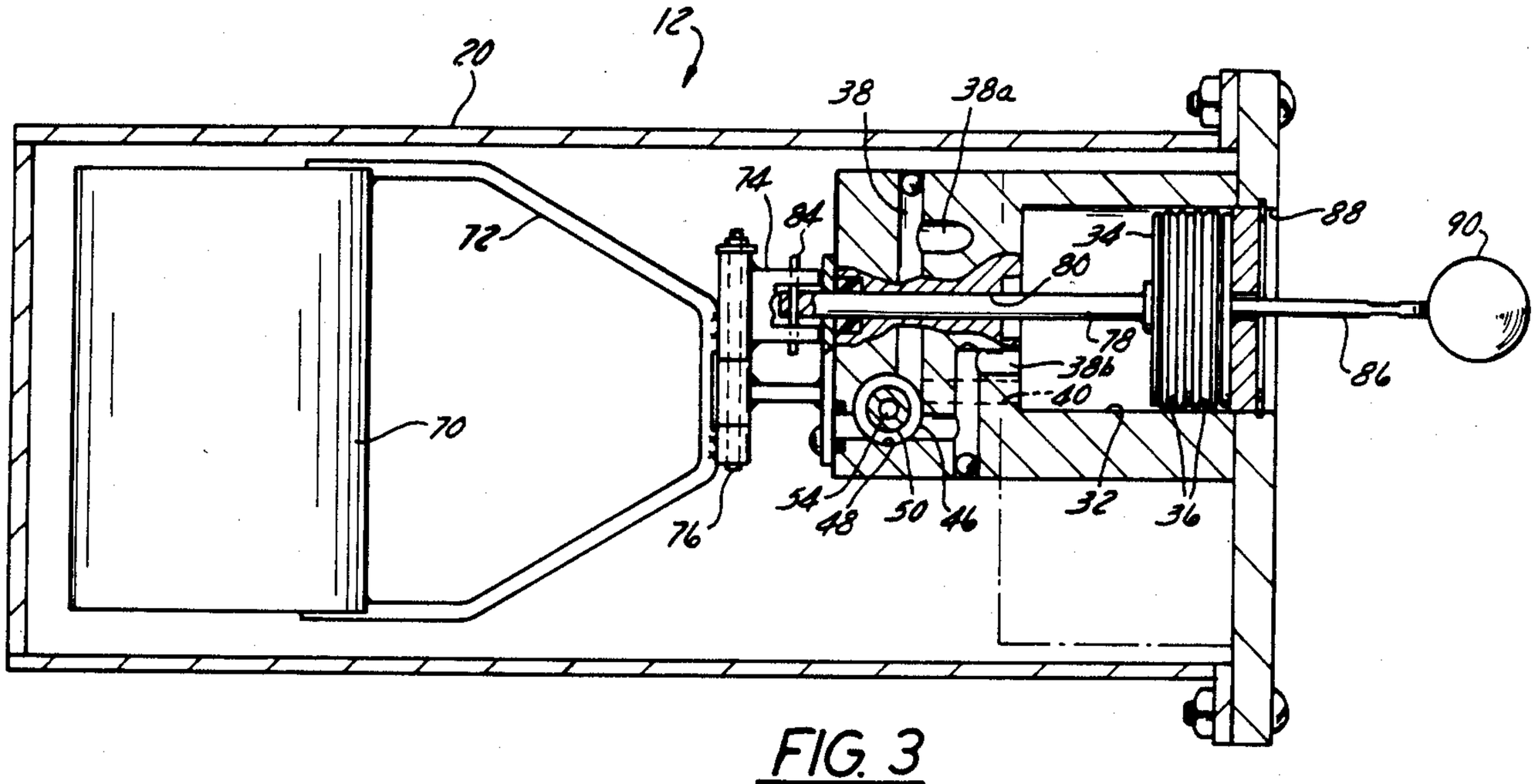
FIG. 2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38a
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FIG. 3

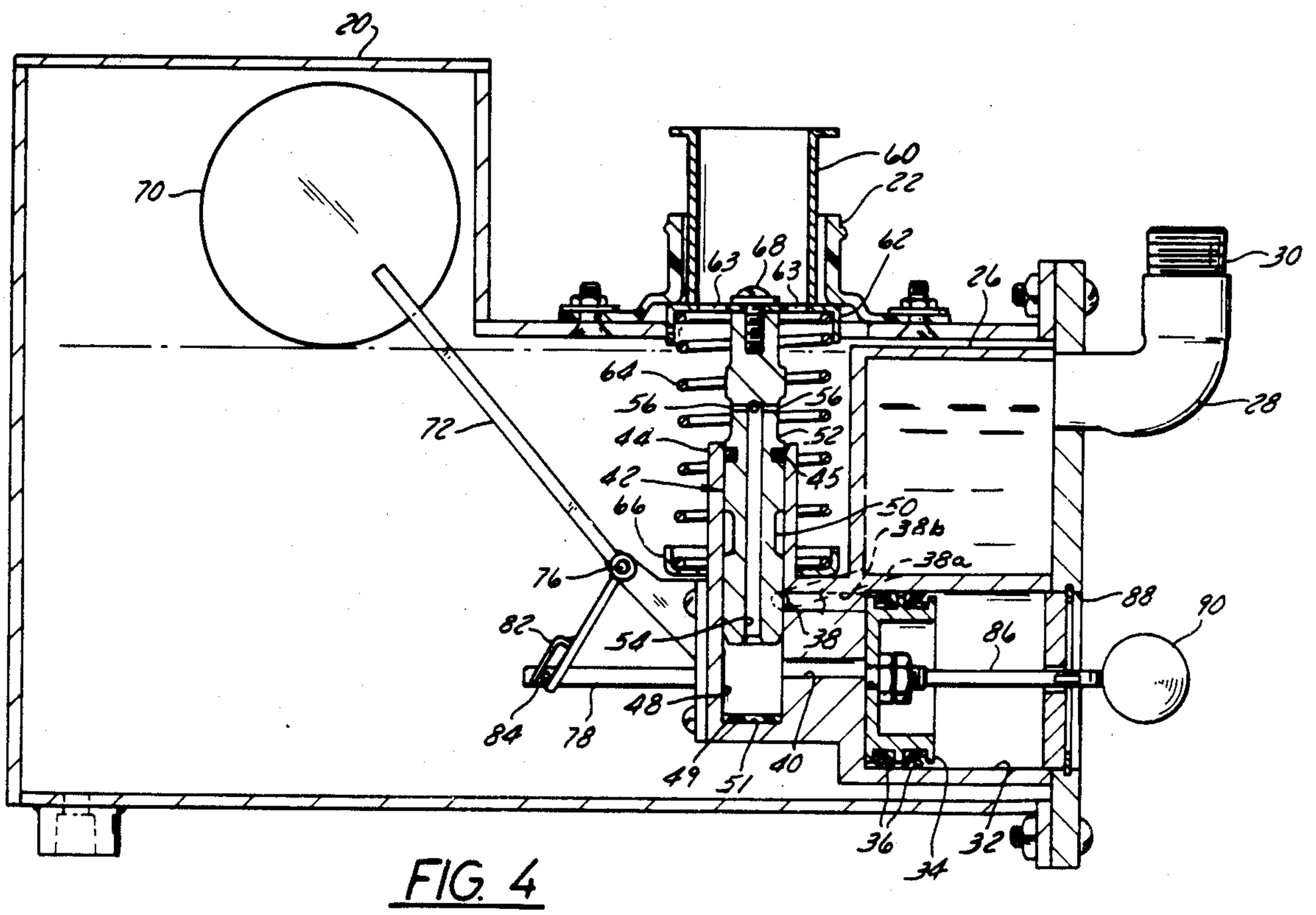
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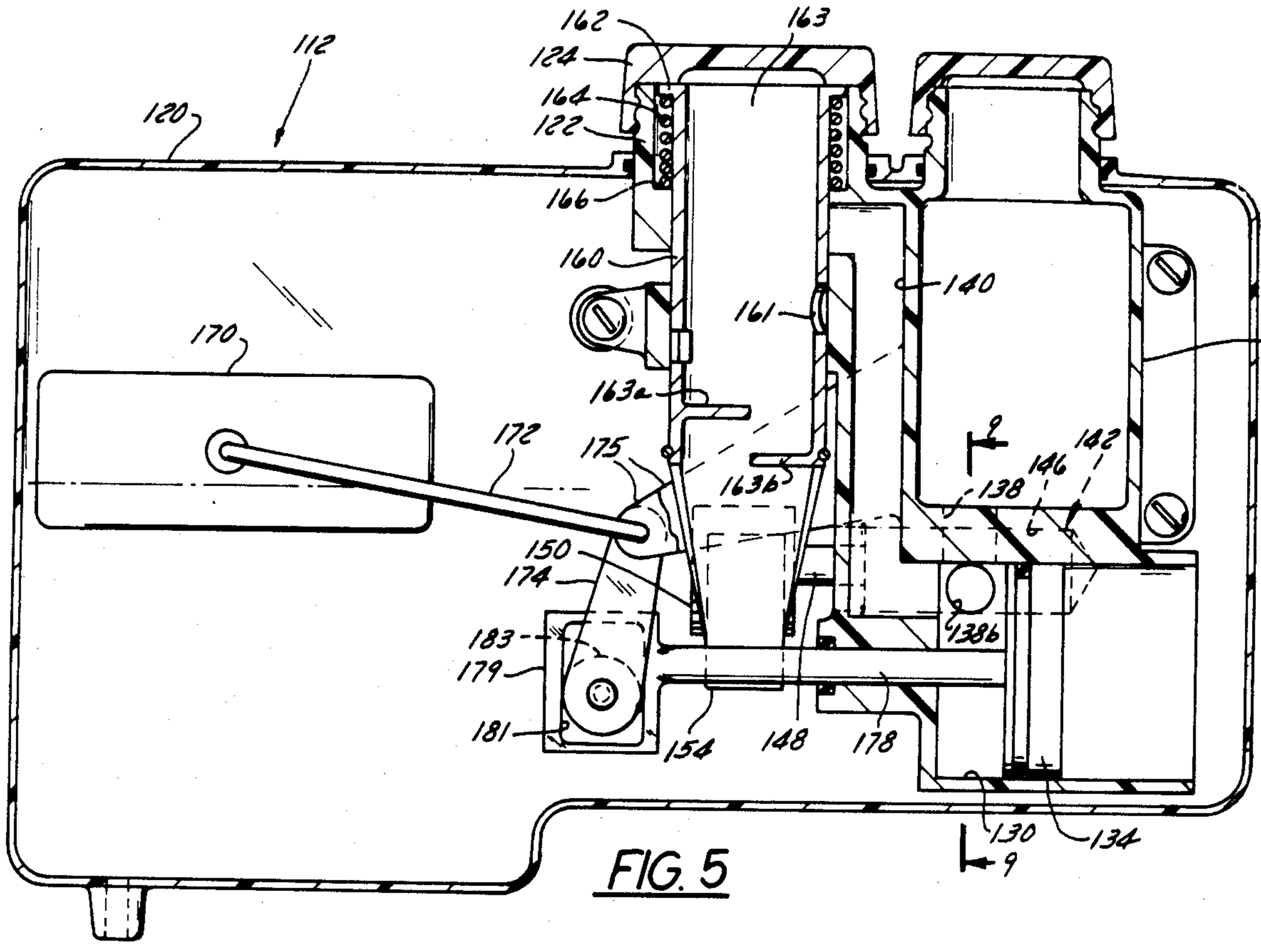
FIG. 4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126
163a
172
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FIG. 5

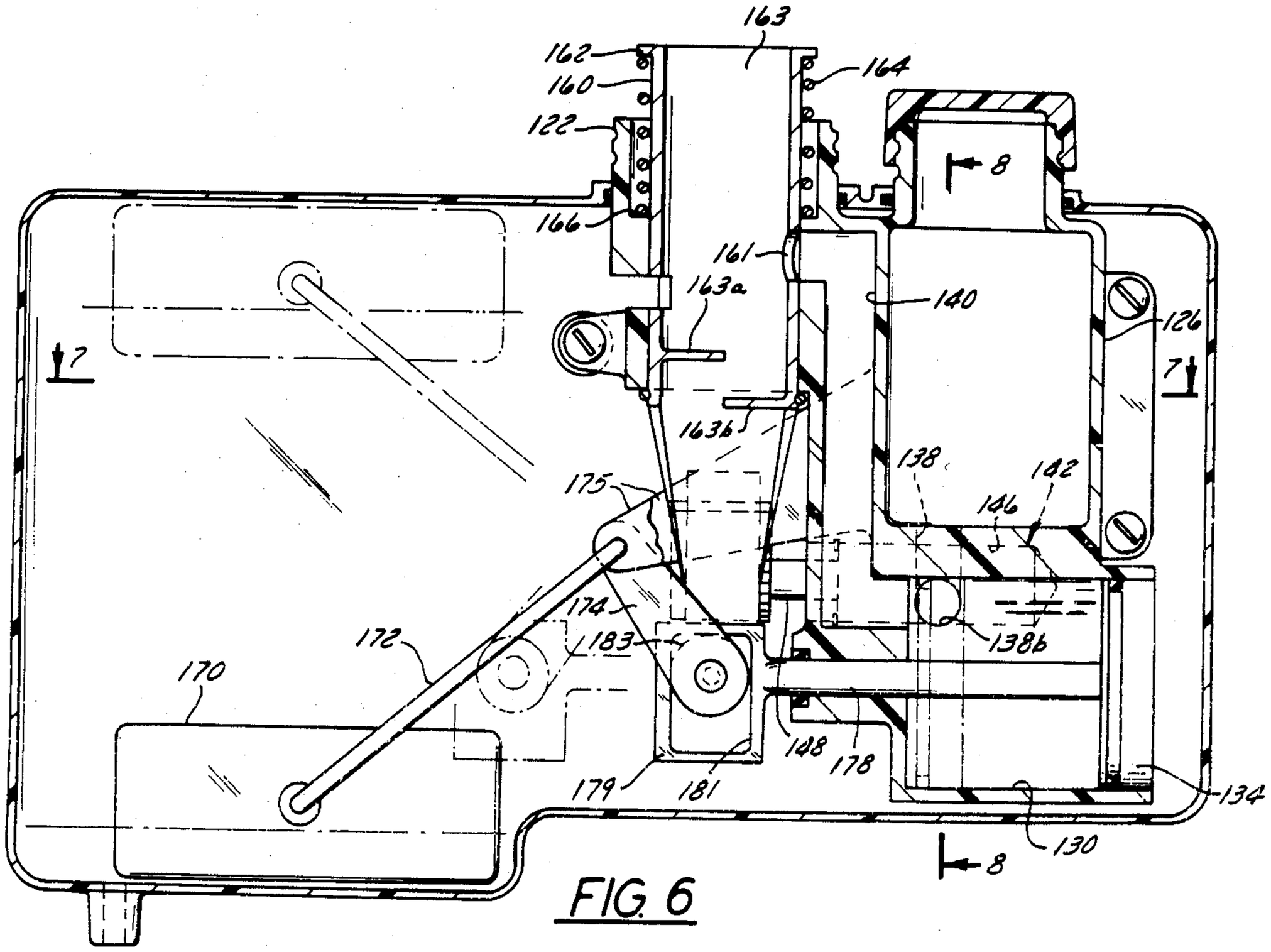
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FIG. 6

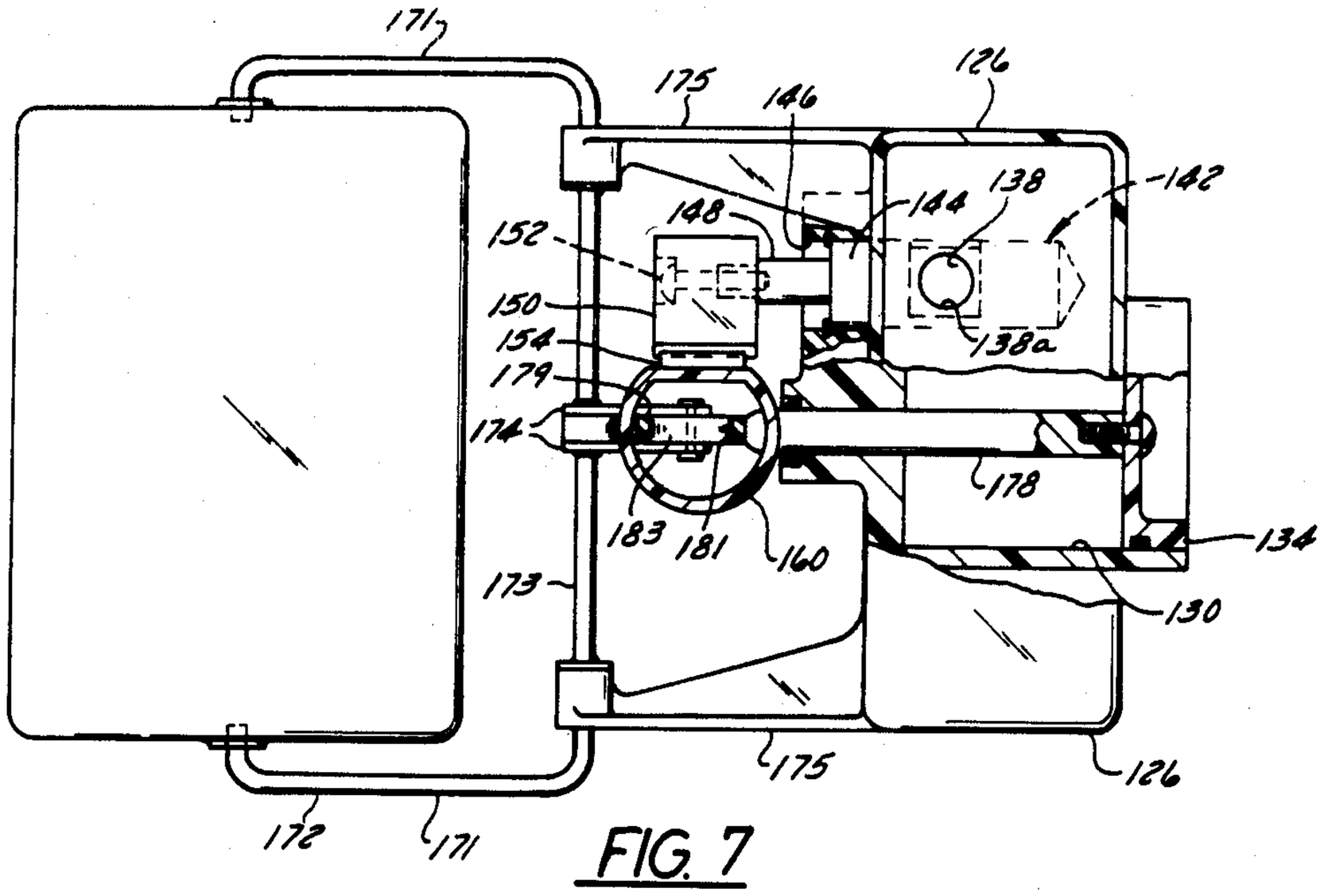

FIG. 7

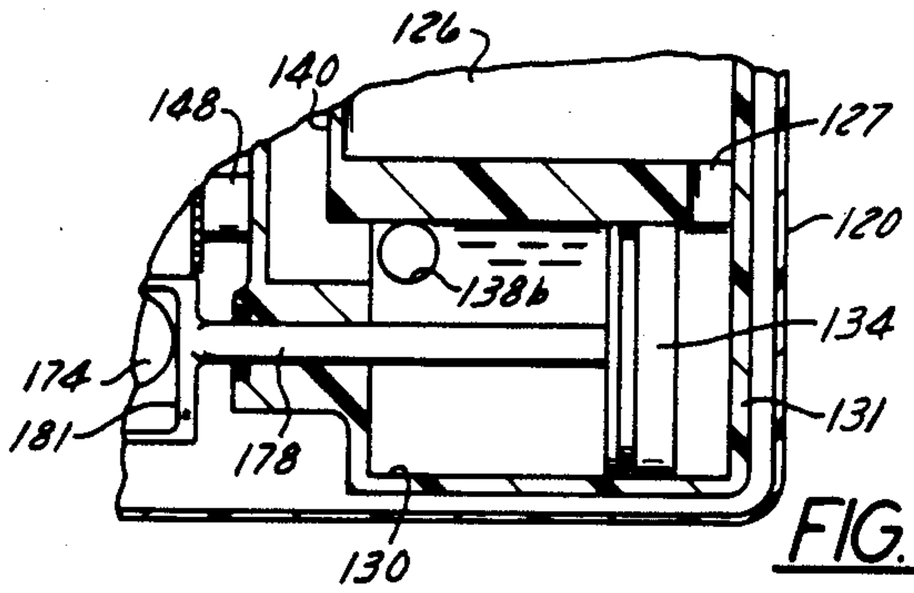

FIG. 10

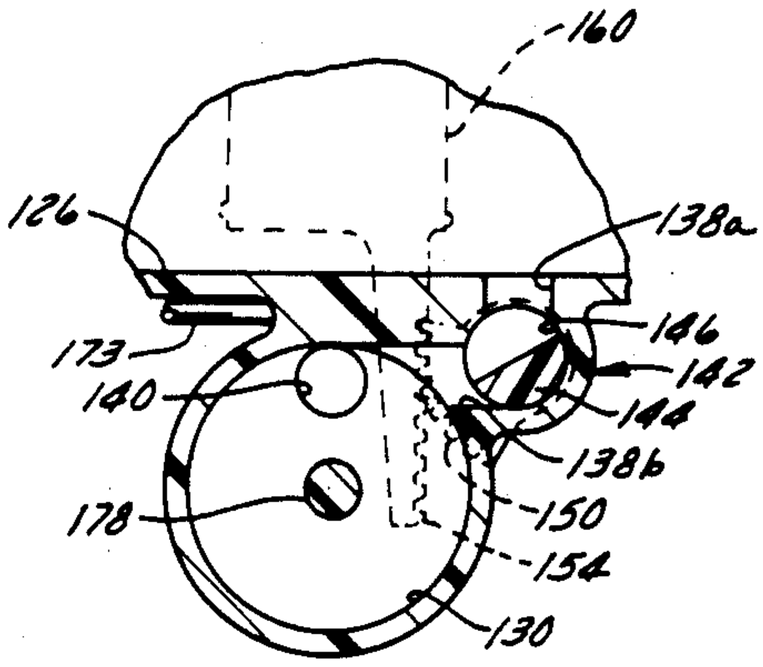

FIG. 9

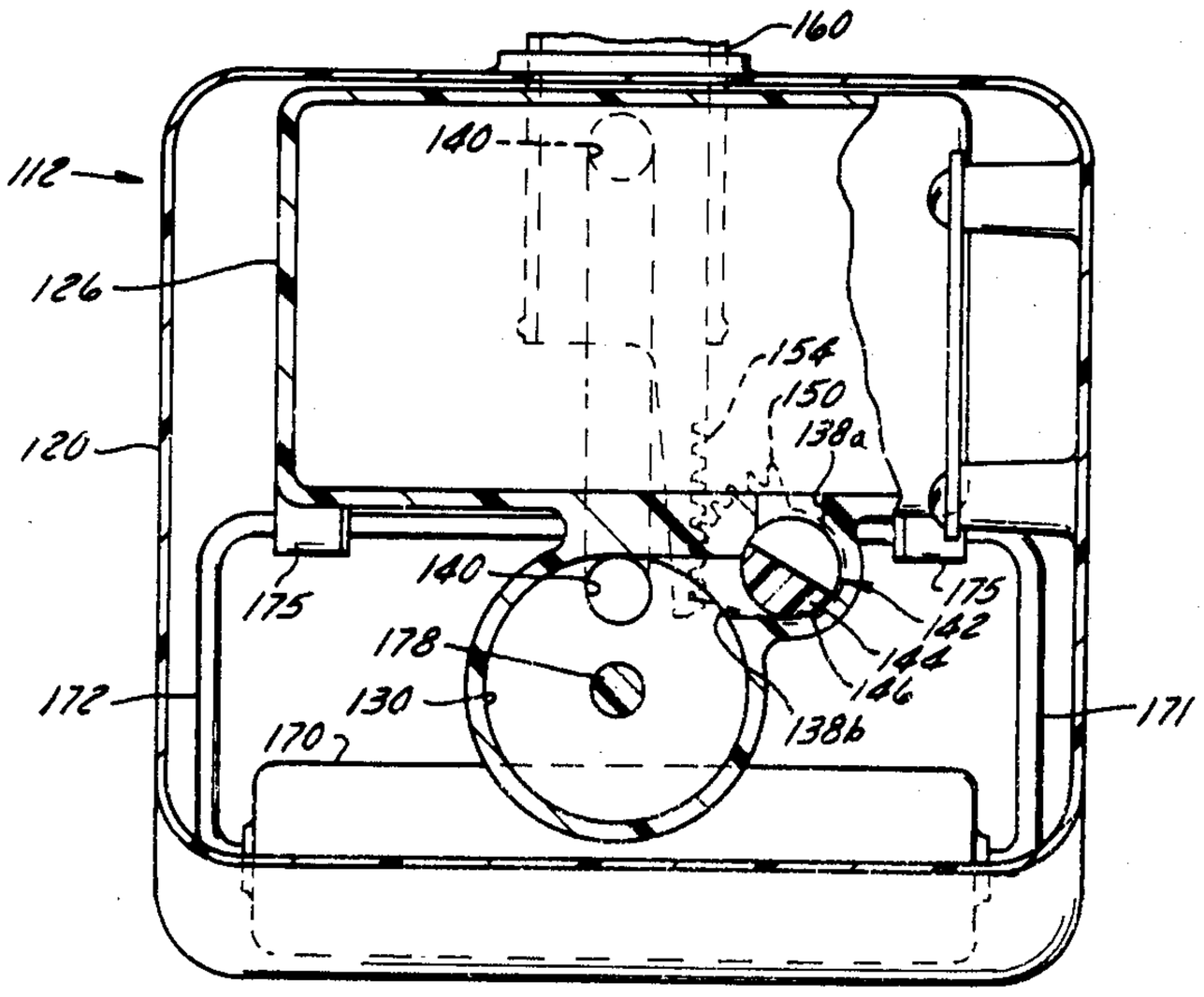

FIG. 8

OIL METERING DEVICE FOR SUPPLYING OIL TO A FUEL TANK

FIELD OF THE INVENTION

The invention relates generally to fuel tanks for two cycle engines such as those used in lawn mowers or marine propulsion units and more particularly to means for automtically mixing a suitable quantity of oil with gasoline added to the fuel tank.

BACKGROUND PRIOR ART

In two-cycle engines of the type employed in lawn mowers and outboard engines, oil is mixed with gasoline in the appropriate amounts by manually adding a measured quantity of oil to the fuel tank at the time that the gasoline is added to the tank.

As described in the Walworth U.S. Pat. No. 4,381,741, issued May 3, 1983, some two-cycle outboard engines also include two separate containers, one for gasoline and one for oil, and means are also provided for pumping gasoline and oil to the engine where they are mixed in suitable proportions and then fed directly to the combustion chambers of the engine.

Attention is also directed to an apparatus for mixing scale reducing chemicals with water added to a boiler illustrated in the Averill U.S. Pat. No. 1,577,157 issued Mar. 16, 1926.

Attention is further directed to the Houseman et al. U.S. Pat. No. 4,312,595 issued Jan. 26, 1982; the Miller et al. U.S. Pat. No. 3,345,997 issued Oct. 10, 1967 and the British Patent No. 517,635 dated July 31, 1937.

SUMMARY OF THE INVENTION

The present invention provides an apparatus for mechanically mixing oil with gasoline in a fuel tank when gasoline is added to the fuel tank, and the oil is added in a measured amount depending on the quantity of gasoline added to the fuel tank.

More particularly the invention includes a tank for use in containing a liquid mixture, the tank including a first container adapted to contain the liquid mixture, the first container including an inlet opening adapted to receive a first liquid. The tank also includes a second container adapted to contain a second liquid, and means are further provided for selectively delivering a measured quantity of the second liquid from the second container to the first container when the first liquid is added to the first container, and such that the volume of the second liquid delivered to the first container is proportional to the volume of the first liquid added to the first container. The means for selectively delivering a measured quantity of the second liquid to the first container includes means defining a metering chamber and means for alternatively providing fluid communication between the metering chamber and the first container and the metering chamber and the second container.

The invention also includes a fuel tank including a first container adapted to contain a fuel mixture and including an inlet opening adapted to receive fuel, and a second container adapted to contain a second liquid. Means are further provided for selectively delivering a measured quantity of the second liquid from the second container to the first container when fuel is added to the first container with the volume of the second liquid delivered to the first container being proportional to the volume of fuel added to the first container.

In one embodiment of the invention the means for selectively delivering a measured quantity of the second liquid to the first container includes means defining a metering chamber and means for alternatively providing fluid communication between the metering chamber and the first container and between the metering chamber and the second container.

In one embodiment of the invention the means for selectively delivering a measured quantity of the second liquid includes a float housed in the first container, a piston housed in the metering chamber, and means for operably connecting the float to the piston to cause reciprocal movement of the piston in the metering chamber in response to vertical movement of the float.

In one embodiment of the invention the means for operably connecting the float to the piston includes a first lever arm having opposite ends, one of the opposite ends being fixed to the float and the other of the opposite ends being pivotably supported. A second layer arm is fixed to the first lever arm for pivotal movement with the first lever arm, and means are also provided for connecting the second lever arm to the piston for causing reciprocal movement of the piston in response to vertical movement of the float.

In one form of the invention the fuel tank includes a fuel tank cap for removably closing the inlet opening, and the means for alternatively providing fluid communication includes valve means including a valve member supported for movement between a first position and a second position. Means are further provided for moving the valve member to the first position when the fuel tank cap closes the inlet opening and for moving the valve member to the second position when the fuel tank cap is removed from the inlet opening.

In one form of the invention the valve means provides fluid communication between the metering chamber and the second container when the valve member is in the first position and provides fluid communication between the metering chamber and the first container when the valve member is in the second position.

In one form of the invention the means for moving the valve member includes a sleeve housed in the inlet opening and supported therein for vertical reciprocal movement between a first position and a second position. Spring means are compressed between a portion of the sleeve and the first container, and the spring means bias the sleeve toward the second position. The valve member is supported for movement with the sleeve such that the valve member is in the valve member first position when the sleeve is in the sleeve first position, and the valve member is in the valve member second position when the sleeve is in the sleeve second position.

In one embodiment of the invention the valve means is a spool valve including a valve spool supported for reciprocal movement, and the valve spool is fixed to the sleeve for movement with the sleeve.

In one embodiment of the invention the means for alternative providing fluid communcation includes a first valve for selectively connecting the metering chamber to the first container and a second valve for selectively connecting the metering chamber to the first container. The second valve means comprises a valve member supported for rotation about an axis, and rack and pinion means are provided for causing selective rotation of the valve member.

One of the advantages of the invention is that the apparatus provides a convenient means for adding oil to fuel in a fuel tank in carefully controlled amounts, and

the operator does not have to measure the oil added to the fuel tank or manually add the oil to the fuel. Additionally, the apparatus embodying the invention can include an oil reservoir having the capacity to hold a sufficient amount of oil so that the fuel tank can be filled several times without the addition of oil to the oil reservoir.

Another of the advantages of the present invention is that the apparatus provides a mechanical means for injecting a proper amount of oil into the fuel added to the fuel tank regardless of the amount of gasoline added to the fuel tank.

Various other features and advantages of the invention will be apparent by reference to the following description of a preferred embodiment, from the drawings and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a lawn mower embodying the present invention.

FIG. **2** is an enlarged cross section elevation view of the fuel tank of the lawn mower shown in FIG. **1**.

FIG. **3** is a cross section plan view of the fuel tank illustrated in FIG. **2** and taken along line **3—3** in FIG. **2**.

FIG. **4** is a view similar to that shown in FIG. **2** but showing the fuel tank cap removed and the fuel tank filled with fuel.

FIG. **5** is a view similar to FIG. **2** but showing an alternative embodiment of the fuel tank.

FIG. **6** is a view similar to that of FIG. **5** but showing the fuel tank cap removed and the fuel tank empty.

FIG. **7** is a cross section plan view taken generally along line **7—7** in FIG. **6**.

FIG. **8** is a vertical cross section view taken along line **8—8** in FIG. **6**.

FIG. **9** is a partial vertical cross section view taken along line **9—9** in FIG. **5**.

FIG. **10** is a partial view similar to FIGS. **2** and **5** but showing another alternative embodiment of the invention.

Before describing a preferred embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction nor to the arrangement of the components set forth in the following description nor illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Illustrated in FIG. **1** is a lawn mower **10** including a fuel tank **12** embodying the present invention. The lawn mower **10** includes a blade housing **14** supported by a plurality of wheels **16** for movement along the ground. The blade housing supports an engine **18**, and the fuel tank **12** is connected to the engine to supply fuel to the engine. It should be understood that while the fuel tank **12** is described as being operably embodied in a lawn mower, the fuel tank **12** could also be used to supply fuel to an outboard motor or comprise a fuel tank for use with other machines empoying a two-cycle engine. Additionally, while the illustrated tank **12** as described herein is adapted to contain a mixture of gasoline and oil, in other embodiments of the invention, the tank **12** could be used to contain other liquid mixture and provide a means for insuring mixing of suitable quantities of a liquid additive with a primary liquid.

The fuel tank **12** includes a first container **20** adapted to house a quantity of a primary liquid such as gasoline. The fuel tank **12** also includes a filling neck **22** defining an inlet opening to facilitate the addition of gasoline to the container **20**. Means are also provided for selectively closing the inlet opening. While this means for closing could have various constructions, in the illustrated arrangement the filling neck **22** includes a threaded upper end and a conventional cap **24** is threaded onto the upper end of the filling neck **22**.

The fuel tank **12** also includes a second container means. In the illustrated arrangement the second container means comprises an oil reservoir or tank **26** and a second filling neck **28** is provided to permit filling of the oil reservoir **26**. A cap **30** is threaded onto the upper end of the oil reservoir filling neck **28**. In a preferred form of the invention, the second container means is sized such that it can hold a sufficient quantity of oil so that the required quantity of oil can be mixed with fuel in the fuel tank several times before refilling of the second container or oil reservoir **26** is required.

While in the illustrated construction the second container or oil reservoir **26** is housed in the first container **20**, in other arrangments the second container **26** can be outside of the first container **20** and communicate with the first container through conduits. Additionally, it should also be understood that the first container **20** and the oil reservoir **26** could be spaced apart or remote from one another.

Means are also provided for selectively delivering a measured quantity of oil to the first container **20** when gasoline is added to the first container and such that the volume of oil added to the first container **20** is proportional to the volume of fuel added to the first container. The means for selectively delivering oil to the first container **20** includes a metering chamber **32** housing a piston **34** supported for reciprocal movement. While the metering chamber **32** could have other constructions, in the illustrated arrangement it is defined by a cylinder, and the piston **34** includes a pair of circumferentially extending grooves housing resilient seals **36** to provide a fluid-tight sliding seal between the piston **34** and the wall of the metering chamber **32**.

The means for selectively delivering oil to the first container **20** also includes means for alternatively connecting the oil reservoir **26** with the metering chamber **32** and the metering chamber **32** with the first container **20**. This means includes a first conduit **38** for selectively connecting the oil reservoir **26** to the metering chamber **32** and a second conduit **40** selectively connecting the metering chamber **32** to the first container **20**. Valve means are also provided for alternatively opening the first conduit **38** and closing the second conduit **40** or closing the first conduit **38** and opening the second conduit **40**.

While the valve means could have various constructions, in the arrangement illustrated in FIG. **2**, the valve means comprises a spool valve **42** including a valve body **44** and a valve sppol **46**. The valve body **44** includes a cylinder or bore **48** having a closed lower end **51** and being open at its upper end. An O-ring seal **45** surrounds the valve spool **46** and provides a seal with the bore **48**. The valve spool **46** includes a pair of spaced apart circumferentially extending grooves **50** and **52**. The valve spool **46** also includes a central longitudinally

extending bore **54** extending from the lower end of the valve spool **46**, the central longitudinally extending bore **54** having an upper end communicating with the upper groove **52** of the valve spool through radially extending bores **56**.

In the arrangement illustrated in FIGS. **2–4**, the first conduit **38** is comprised of a first portion **38***a* which extends from the oil reservoir **26** to the valve bore **48** and a second portion **38***b* which extends from the valve bore **48** to the metering chamber **32**. When the valve spool **46** is in the position shown in FIG. **2**, the groove **50** in the valve spool **46** provides for fluid communication between the first and second portions **38***a* and **38***b* of the first conduit **38**.

In the arrangement illustrated in FIG. **2** the second conduit **40** extends from the metering chamber **32** to a lower portion of the valve bore **48**. When the valve spool **46** is in the position shown in FIG. **4**, the conduit **40** communicates with the valve bore **48** and oil can flow from the metering chamber **32** through the second conduit **40** into the valve bore **48** and upwardly through the central longitudinally extending bore **54** and the radially extending bores **56** into the first container **20**.

In operation of the spool valve **42**, when the valve spool **46** is in the position shown in FIG. **2**, the groove will provide fluid communication through the first and second portions **38***a* and **38***b* of the first conduit between the oil reservoir **26** and the metering chamber **32** and facilitate free flow of oil therebetween. The lower end of the valve spool **46** will block the second conduit **40** and prevent flow of fluid between the metering chamber **32** and the first container **20**. A soft resilient washer **49** is also housed in the lower end of the valve bore **48** and prevents fluid flow through the central longitudinally extending bore **54** when the valve spool **46** is in the FIG. **2** position.

Means are also provided for causing movement of the valve spool **46** such that when the fuel tank cap **24**, which is threaded onto the first container filling neck **22**, is removed, the valve means **42** interrupts communication between the oil reservoir **26** and the metering chamber **32** and provides fluid communication between metering chamber **32** and the first container **20**. While various means could be provided for causing movement of the valve spool **46** when the fuel tank cap **24** is removed, in the arrangement illustrated in FIGS. **2–4**, a sleeve **60** is housed in the neck **22** and means are provided for supporting the sleeve **60** for vertical slideable movement in the neck **22**. As shown in FIG. **2**, the cylindrical tubular sleeve **60** has an outside diameter only slightly smaller than the inside diameter of the neck **22**, but sufficiently small that the tubular sleeve **60** is freely slideably moveable within the neck. The means for supporting the tubular sleeve includes a circular end cap **62** secured to the lower end of the sleeve **60**. A coil spring **64** is positioned beneath the end cap **62** and is compressed between the end cap **62** and a complementary flange **66** supported by the valve body. The coil spring **64** applies an upward force on the sleeve **60**. The circular end cap **62** includes a plurality of openings **63** to permit flow of gasoline through the sleeve into the container **20**.

In the construction illustrated, the upper end of the valve spool **46** is fixed to the end cap **62** by a screw **68** and is carried by the end cap **62** for vertical reciprocal movement with the sleeve **60** housed in the neck **22**. When the fuel tank cap **24** is removed, the coil spring **64** forces the sleeve **60** and the valve spool **46** upwardly to the position interrupting fluid communication between the oil reservoir **26** and the metering chamber **32** and providing fluid communication between the metering chamber **32** and the first container **20**.

Means are also provided for causing oil to be pumped or forced into the first container **20** from the metering chamber **32** in response to the addition of gasoline to the first container **20**. This means for pumping oil into the first container **20** provides for a measured flow of oil and in amounts proportional to the amount of gasoline added to the first container **20**. While this means could be constructed in various ways, in the illustrated arrangement it includes a float **70** housed in the first container **20**. Means are also provided for connecting the float **70** to the piston **34** housed in the metering chamber **32** and to cause movement of the piston **34** so as to inject oil into the first container **20** in response to upward movement of the float **70**. In the particular arrangement illustrated in FIG. **2** this means includes a lever arm **72** having one end fixed to the float **70**, and the opposite end of the lever arm **72** is supported for pivotal movement so as to permit free vertical movement of the float **70**. A second lever arm **74** is fixed to the pivoting end of the first lever arm **72** to form a bellcrank and pivots with the first lever arm **74** about a pivot pin **76** supporting the first lever arm. A piston rod **78** extends from the piston **34** through a bore **80** in the valve body into the first container **20**. The lower end of the second lever arm **74** defines a fork **82** housing a pin **84** in the first container. The fork **82** and pin **84** provide a sliding connection between the piston rod **78** and the bellcrank defined by the first and second lever arms **72** and **74** so as to cause linear reciprocal movement of the piston rod **78** and the piston **34** in response to vertical movement of the float **70**.

In operation of the apparatus illustrated in FIG. **3**, when the cap **24** is removed and gasoline is added to the first container **20** thereby causing upward movement of the float **70**, the bellcrank will pivot in a clockwise direction around the pivot pin **76** and the lower end or fork portion **82** of the second lever arm **74** will move to the left as seen in FIG. **3**, thereby pulling the piston rod **78** and the piston **34** to the left. Such movement of the piston **34** causes oil to be forced from the metering chamber **32** into the first container **20**. The amount of oil delivered to the first container **20** from the metering chamber **32** is dependent on the vertical movement of the float **70** since the amount of horizontal movement of the piston **34** is directly proportional to the amount of movement of the float **70**. If only a portion of the first container **20** is filled, the piston **34** will force only a portion of the oil in the metering chamber **32** into the first container **20**.

When the fuel tank cap **24** is in place on the neck **22** and thus the valve spool **46** is in the position shown in FIG. **2**, the oil reservoir **26** and the metering chamber **32** are maintained in communcation with one another so that oil may move freely between the oil reservoir **26** and the metering chamber **32**. Any movement of the fuel tank **12** causing vertical movement of the float **70** can cause reciprocal movement of the piston **34** such that the oil will flow back and forth between the oil reservoir **26** and the metering chamber **32**.

In the particular arrangement illustrated in FIGS. **2–4**, the apparatus further includes means for indicating the position of the piston **34** in the metering chamber. This means comprises a rod **86** fixed to the piston **34** and extending through a bore **88** from the fuel tank **12**. A

knob **90** is positioned on the end of the rod **86** and is thereby fixed to the piston **34** so as to move toward and away from the sidewall of the container **20** in response to movement of the piston **34** in the metering chamber **32**. Since the piston **34** is fixed to the float **70** and is moveable in response to movement of the float **70**, the knob **90** functions as an indicator of the fuel level in the fuel tank **12**.

FIGS. **5–9** illustrate an alternative embodiment of the invention. The construction shown there includes a fuel tank **112** for use with a two-cycle engine and defining a first fuel container or tank **120** adapted to contain a mixture of gasoline and including a threaded filling neck **122** adapted to be closed by a threaded cap **124**. The fuel tank houses a second container **126** adapted to contain a supply of oil to be mixed in the fuel tank **112** with gasoline. Also contained within the fuel tank **112** is a cylindrical metering chamber **130** for containing oil supplied by the second container **126**. A piston **134** is housed in the metering chamber **130** and provides a means for forcing measured quantities of oil into the first container **120** to be mixed with gasoline therein.

Means are also provided for causing reciprocal movement of the piston **134** in the metering chamber **130** in response to movement of a float **170** housed in the first container **120**. A bellcrank comprised of a first lever arm assembly **172** and a second lever arm assembly **174** is supported by a pair of brackets **175** for relatively free pivotal movement about a horizontal pivot axis. A free end of the first lever arm assembly **172** is connected to the float **170** and is carried by the float for vertical movement. More specifically, the first lever arm assembly **172** is comprised of a pair of a spaced apart arms **171** joined by a connecting rod **173**. In the illustrated arrangement of FIGS. **5–9**, the brackets **175** extend from the oil reservoir **126**, and the integral molded part of the reservoir **126**, and the brackets **175** include aligned bores housing the connecting rod **173**. Free ends of the spaced apart arms **171** engage the float **170** therebetween, and the connecting rod **173** is supported by the brackets **175** for free pivotal movement about the longitudinal axis of the connecting rod. A piston rod **178** is connected to the piston **134** and includes an end **179** defining a generally vertically extending slot **181**. The second lever arm assembly **174** is comprised of a pair of arms, the free ends of these arms supporting a roller **183** which is, in turn, housed in the slot **181** in the piston, and the roller **183** is freely vertically moveable in that slot.

In the construction illustrated in FIGS. **5** through **9**, a first conduit **138** provides fluid communication between the oil reservoir **126** and the metering chamber **130** and a second conduit **140** provides for flow of oil from the metering chamber **130** into an upper part of the fuel tank **120**.

As in the embodiment of the invention shown in FIGS. **5–9** means are also provided for selectively preventing oil flow from the metering chamber **130** into the fuel tank **120** when the fuel cap **124** is in place on the neck **122** and for permitting oil flow from the metering chamber **130** into the fuel tank **120** when the cap **124** is removed from the neck **122**. This means includes a rotary valve assembly **142** (FIGS. **7**, **8** and **9**) including a valve member **144** housed in a valve bore **146** and supported for rotation between a first position shown in FIG. **9** and a second position shown in FIG. **8**. In the FIG. **9** position, fluid communication is provided through passages **138***a* and **138***b* between the metering chamber **130** and the oil reservoir **126**, and fluid communication between the metering chamber **130** and the second conduit **140** is prevented. In the FIG. **8** position fluid communication between the metering chamber **130** and the oil reservoir **126** is prevented, and the metering chamber **130** and the second conduit **140** are placed in fluid communication. This means for selectively preventing oil flow from the metering chamber **130** into the fuel tank **120** when the fuel cap **124** is in place on the neck **122** and for permitting oil flow from the metering chamber **130** into the fuel tank **120** when the cap **120** is removed also includes a vertically reciprocable sleeve **160** housed in the filler neck **122** and supported therein for slidable movement between a lower position shown in FIG. **5** and the raised position shown in FIG. **6**. The sleeve **160** includes a central bore **163** to provide for flow of fuel into the container **120**. The upper end of the sleeve **160** is surrounded by a peripheral flange **162** and an internal shoulder **166** is provided in the lower portion of the filler neck **122**. A compression spring **164** is provided between the flange **162** and the shoulder **166** and biases the sleeve **160** toward the raised position shown in FIG. **6**.

In the embodiment of the invention shown in FIGS. **5–9**, the sleeve **160** also forms a valve means for selectively permitting oil flow from the metering chamber **130** into the fuel tank **120** to mix with gasoline in the fuel tank. More particularly, the sleeve **160** includes a bore **161** which is aligned with the conduit **140** when the sleeve is in the position shown in FIG. **6** to permit oil flow into the bore **163** and into the fuel tank **120**. When the fuel cap **124** is in place as shown in FIG. **5**, and the sleeve **160** is forced downwardly to the lowered position, the sleeve **160** closes the conduit **140** and prohibits oil flow into the fuel tank **120**.

In the illustrated construction, the sleeve **160** also includes a pair of opposed baffles **163***a* and **163***b* extending inwardly from the walls of the sleeve **160**. The baffles **163***a* and **163***b* are provided to cause turbulence of fuel and oil in the bore **163** to thereby cause mixing of the fuel and oil.

Means are also provided for causing pivotal movement of the valve member **144** when the fuel tank cap **124** is removed and replaced and to thereby cause the valve member **144** to be positioned as shown at FIG. **9** when the fuel cap **124** is in place to thereby provide for oil flow between the oil reservoir **126** and the metering chamber **130**. The means for causing pivotal movement of the valve member **144** also causes movement of the valve member **144** to the position shown in FIG. **8** when the fuel cap **124** is removed and to thereby provide for interruption of the oil flow between the oil reservoir **126** and the metering chamber **130** and free flow of oil from the metering chamber **130** through the conduit **140** to the fuel tank.

In the arrangement shown in FIGS. **5–9** the valve member **144** is supported for rotation by a shaft **148**, and a pinion **150** is fixed to the shaft **148** by a screw **152**. The lower end of the sleeve **160** is constructed so as to form a rack **154** including teeth adapted to mesh with complementary teeth of the pinion **150** and such that vertical movement of the sleeve **160** in the filler neck **122** will cause rotation of the pinion **150** and the shaft **148** thereby causing consequent rotation of the valve member **144**.

FIG. **10** illustrates another alternative embodiment of the invention similar to that shown in FIGS. **5–9**. In the embodiment shown in FIG. **10** the cylindrical metering

chamber **130** includes an end wall **131** comprising an integral portion of the second container **126**. A port **127** provides for free flow of oil between the oil reservoir and the cylindrical metering chamber **130** on one side of the piston **134** while conduit **138** provides for oil flow between the oil reservoir and that portion of the cylindrical metering chamber on the opposite side of the piston **134**. By providing oil on both sides of the piston **134**, the effect of any leakage past the piston **134** is minimized.

Various features of the invention are set forth in the following claims:

We claim:

1. A fuel tank including a first container means adapted to contain a fuel mixture and including an inlet opening adapted to receive fuel, a second container means adapted to contain a second liquid, and means for selectively delivering a measured quantity of the second liquid from said second container means to said first container means when fuel is added to said first container means, the volume of the second liquid being delivered to said first container means being proportional to the volume of fuel added to said first container means, said means for selectively delivering a measured quantity of said second liquid including means defining a metering chamber and means for alternatively providing fluid communication between said metering chamber and said first container means and between said metering chamber and said second container means.

2. A fuel tank as set forth in claim **1** wherein said means for selectively delivering a measured quantity of said second liquid includes a float housed in said first container means, a piston housed in said metering chamber, and means for operably connecting said float to said piston to cause reciprocal movement of said piston in said metering chamber in response to vertical movement of said float.

3. A fuel tank as set forth in claim **2** wherein said means for operably connecting said float to said piston includes a lever arm having opposite ends, one of said opposite ends being carried by said float and the other of said opposite ends being pivotably supported, a second lever arm fixed to said first lever arm for pivotal movement with said first lever arm, and means for connecting said second lever arm to said piston for causing reciprocal movement of said piston in response to vertical movement of said float.

4. A fuel tank as set forth in claim **1** wherein said means for alternatively providing fluid communication includes valve means including a valve member supported for movement between a first position and a second position and further including a fuel tank cap for removably closing said inlet opening.

5. A fuel tank as set forth in claim **4** and further including means for moving said valve member to said first position when said fuel tank cap closes said inlet opening and means for moving said valve member to said second position when said fuel tank cap is removed from said inlet opening.

6. A fuel tank as set forth in claim **5** wherein said valve means provides fluid communication between said metering chamber and second container means when said valve member is in said first position and providing fluid communication between said metering chamber and said first container means when said valve member is in said second position.

7. A fuel tank as set forth in claim **5** wherein said means for moving said valve member includes a sleeve housed in the inlet opening and supported therein for vertical reciprocal movement between a first position and a second position and spring means compressed between a portion of said sleeve and said first container means, said spring means biasing said sleeve toward said second position.

8. A fuel tank as set forth in claim **7** wherein said valve member is supported for movement with said sleeve and wherein said valve member is in said valve member first position when said sleeve is in the sleeve first position and said valve member is in the valve member second position when the sleeve is in the sleeve second position.

9. A fuel tank as set forth in claim **7** wherein said valve means is a spool valve including a valve spool supported for reciprocal movement, and wherein said valve spool is fixed to said sleeve for movement with said sleeve.

10. A fuel tank as set forth in claim **1** wherein said means for alternatively providing fluid communication includes a first valve means for selectively connecting said metering chamber to said first container means and a second valve means selectively connecting said metering chamber to said container means.

11. A fuel tank as set forth in claim **10** wherein said second valve means comprises a valve member supported for rotation about an axis, and rack and pinion means for causing selective rotation of said valve member.

12. A tank for use in containing a liquid mixture, the tank including a first container means adapted to contain the liquid mixture, the first container means including an inlet opening adapted to receive a first liquid, a second container means being adapted to contain a second liquid, and means for selectively delivering a measured quantity of said second liquid from said second container means to said first container means when the first liquid is added to said first container means, the volume of the second liquid being delivered to said first container means being proportional to the volume of the first liquid added to said first container means, said means for selectively delivering a measured quantity of said second liquid to said first container means including means defining a metering chamber and means for alternatively providing fluid communication between said metering chamber and said first container means and said metering chamber and said second container means.

13. A tank as set forth in claim **12** wherein said means for selectively delivering a measured quantity of said second liquid includes a float housed in said first container means, a piston housed in said metering chamber, and means for operably connecting said float to said piston to cause reciprocal movement of said piston in said metering chamber in response to vertical movement of said float.

14. A tank as set forth in claim **13** and further including a cap for removably closing said inlet opening.

15. A tank as set forth in claim **13** wherein said means for alternatively providing fluid communication includes valve means including a valve member supported for movement between a first position and a second position.

16. A tank as set forth in claim **15** wherein said valve means provides fluid communication between said metering chamber and second container means when said valve member is in said first position and providing fluid communication between said metering chamber and

said first container means when said valve member is in said second position.

17. A tank as set forth in claim **15** and further including a cap for removably closing said inlet opening and means for moving said valve member to said first position when said cap closes said inlet opening and means for moving said valve member to said second position when said cap is removed from said inlet opening.

18. A tank as set forth in claim **17** wherein said means for moving said valve member includes a sleeve housed in the inlet opening and supported therein for vertical reciprocal movement between a first position and a second position and spring means compressed between a portion of said sleeve and said first container means and said spring means biasing said sleeve toward said second position.

19. A tank as set forth in claim **18** wherein said valve member is supported for movement with said sleeve and wherein said valve means is in the valve means first position when said sleeve is in the sleeve first position and said valve means is in the valve means second position when the sleeve is in the sleeve second position.

20. A tank as set forth in claim **19** wherein said valve means is a spool valve including a valve spool supported for reciprocal movement and wherein said valve spool is fixed to said sleeve for movement with said sleeve.

21. A tank as set forth in claim **12** wherein said means for alternatively providing fluid communication includes a first valve means for selectively connecting said metering chamber to said first container means and a second valve means selectively connecting said metering chamber to said second container means.

22. A tank as set forth in claim **21** wherein said second valve means comprises a valve member supported for rotation about an axis and rack and pinion means for causing selective rotation of said valve member.

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